

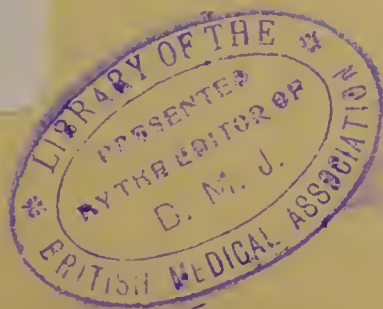
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H. MACNAUGHTON-JONES



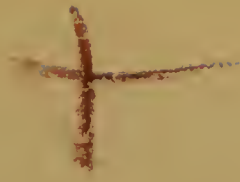
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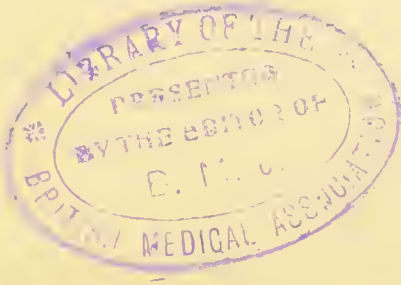
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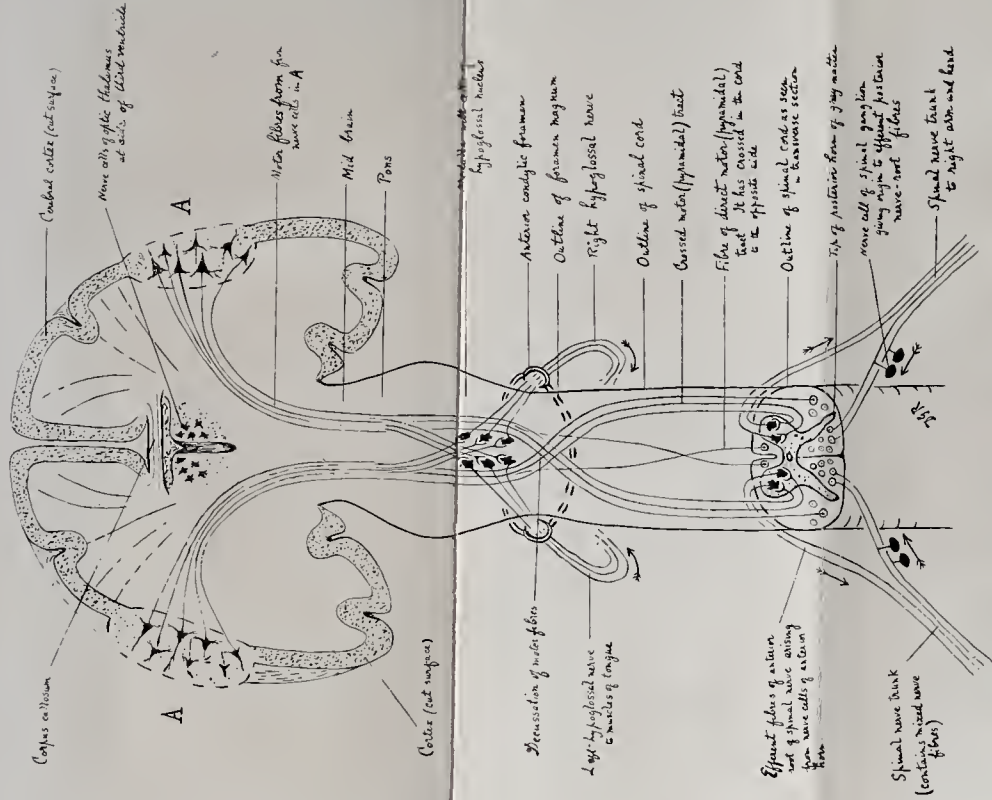
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The scheme (Frontispiece) is intended to give the non-medical reader a general idea of the crossing of the fibres of communication between the speech and writing centres at either side of the brain and the arms and hands. The cortex of the brain (its grey cells and fibres) is shown in section. At either side (AA) are shown the speech and writing centres, with the issuing motor (muscular movement) nerve fibres. These are seen to pass downwards and cross as they issue from the left centre is affected, and vice versa. The crossing of the motor fibres which pass to supply the muscles of the tongue (right and left hypoglossal nerves) is also seen. In the lower section of the scheme the continuation into the spinal chord of the motor fibres and the issuing of these to the arms and hands, can be followed. It also illustrates the junction of these to the nerve trunks from the spinal cord which convey sensation, both kinds being included in the G. Reid for the above scheme).



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# AMBIDEXTERITY AND MENTAL CULTURE

By

H. MACNAUGHTON-JONES

M.D., M.CH., Q.U.I., M.A.O.R.U.I. (HON. CAU.), F.R.C.S.I. AND ED.,  
EX UNIVERSITY PROFESSOR, QUEEN'S UNIVERSITY, IRELAND;  
HONORARY MEMBER OF THE SOCIETIES OF OBSTETRICS AND  
GYNÆCOLOGY, LEIPZIG, MUNICH AND ROME; EX-PRESIDENT OF  
THE OBSTETRIC AND GYNÆCOLOGICAL SECTION OF THE ROYAL  
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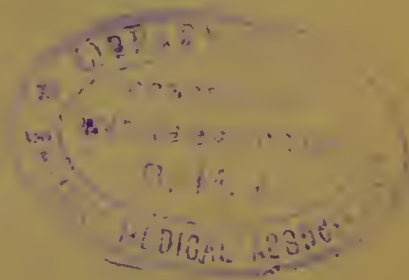
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To

Mr. JOHN JACKSON

*In recognition of his life-long work in the cause of Ambidexterity. No one in this country has devoted so much time and thought to the subject as he has. His researches and writings have drawn the attention of teachers to the advantages that accrue from bi-manual training and more correct methods of instruction in writing in Schools. At his instance, and through the mass of material placed by him at my disposal, the articles which appeared in THE CHILD were written.*





## INTRODUCTION

---

THIS brochure has been published at the suggestion of Dr. KELYNACK, editor of *The Child*, and is an amplification of the articles recently written for that journal. The subject of late years has attracted much attention on the part of those interested in the training and education of the young. It has also been carefully and critically studied by neurologists and physiologists.

A mass of evidence has now been collected and collated which proves that the cultivation of ambidextrous exercises, both in art and writing, has a decided influence on the mind of the growing child, and that such psychophysical effect has a direct bearing on the child's character. This is an important gain apart from the obvious technical advantages which ambidextrous power confers on its possessor.

My design in these pages is to condense in abstract the conclusions that may be drawn from the authoritative opinions of a number of leading physiologists, psychologists, and teachers in this country and abroad. I have to confine myself to a brief review of the main facts which bear on the teaching of Ambidexterity, and which are in accord with physiological and psychological investigation, and are endorsed by technical efficiency.

As they have an important relation to the subject, I have incidentally referred to the "Eurythmics" of

INTRODUCTION.—*Continued.*

Jacques-Dalcroze, and the system of teaching of Dr. MARIA MONTESSORI. I am also much indebted for valuable information to Mdle. VARIA KIPIANI through her brochure, *An Experimental and Critical Study of Ambidexterity*, produced under the direction of Professor Dr. IOTEYKO, of Brussels. With her permission I have reproduced several illustrations, showing both left-handed, mirror, and simultaneous writing, and the method of teaching in the School of Madame MICHIELS.

Dr. Douglas Reid (Cambridge University), has very kindly drawn for me the scheme which forms the frontispiece, shewing the connections between the speech centres and the arms and hands.

I desire to express my thanks to friends whose left-handed work and writing is illustrated in the book, for the assistance they have given me in furnishing me with these examples. I am indebted to Mr. HEINEMANN for permission to copy some of the illustrations from the work published by him on the Maria Montessori Method. The latter book contains a complete account of this author's system, and the various forms of didactic apparatus used by her in the Children's Houses are fully illustrated. (*Childhood, Inc.*, New York).

My thanks are also due to Messrs. CONSTABLE & CO. for permission to copy some of the illustrations in the *Eurythmics of Jacques-Dalcroze*, by J. M. HARVEY, to which brochure an introduction has been written by Professor M. E. SADLER.

H. MACNAUGHTON-JONES,  
HARLEY STREET, W.

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## CHAPTER I

### The Preference for the Right Hand

#### Primeval Man and Ambidexterity.

All the various theories that have hitherto been put forward have failed satisfactorily to account for the original preference for the use of the right over the left hand in the great majority of the race. Take, for examples, the asymmetry and position of the internal organs; the preponderance of weight of one side of the body over the other; differences in weight and early development of the two hemispheres of the brain; the mechanical theory, in which the effect of respiration on muscular development is supposed to react favourably to the right side; the arterial supply, owing to the disposition of the vessels, being greater to the right side than the left; the need to protect the left side of the body

and the heart, or the "catch-who-can" effort of a primeval Melanion in his pursuit of a prehistoric Atalanta. Of some theorists (as of many vanishing ideas of which we hear) we are tempted with Owen Meredith (the late Lord Lytton) to exclaim, "What maggot hath he in his brain ! "

It is interesting to remember that primeval man, in his gradual assumption of the erect position, must have used either hand as indifferently as he used either foot ; though there is always the tendency to give the right foot the prominent position. We see this in the drill room, in the football field, or when it is used instead of "the arm of the flesh" as a ready means of defence or assault. But the expert football "dribbler" must be equally deft with both feet. We have only to watch a man's swing of the arm, and the synchronous action of the opposite leg in walking, side by side with the movements of a horse's legs, to realize the homology in function discharged by the hands as fore-limbs in the dim past of man's earliest development. We know how this arm movement can be completely controlled by education. If we observe the movement of a baby when it is

placed on the ground, we see the same relative action. In the primates below man in the scale, and nearest to him in physical conformation, and in those functional acquisitions consequent upon the use of the fore-limbs, we have a complete example of the employment of either hand in response to brain impulse. The chimpanzee's needs demand the use of both hands, but he has not been educated from the moment of his birth to regard the right as the prehensile one, and as the more highly endowed organ in the subsequent struggle for his existence.

There is a long gap between the adaptation of a limb for climbing or defensive purposes, or its value as a dextrous instrument in games and other physical exercises, and its automatic association with intellectual thought, in the simultaneous transmission of this to the paper or the drawing easel. Nothing in Nature is more wonderful than the fact, that though the interdependence between the higher mental attributes and those musculo-motor responses, in which perception and sensation are called into play, has been maintained for years, yet, let the connecting link between the two be destroyed, and there is an understudy ready

to take on similar duties, which in a little time becomes as proficient as was the experienced but now helpless master. This has been repeatedly shown in cases of loss of speech (aphasia) and right-sided paralysis.\* The central station in the brain is prepared to despatch the trains of thought, and the unused sidings of nerve communication are ready for them to travel on; and the whole motor machinery, slowly at first, but gradually with increased speed, moves in response to the driving force of the will.

If it were true that it could be shown, as has been quite recently suggested by Professor Keith, that the skull of a primeval man has been discovered in which there is no anatomical provision for speech (as we understand articulate language), it would appear that there was a time when no correlation existed between a speech centre in the brain and the preference for the use of either fore-limb.

By the great majority of the race the right hand has been assigned the place of honour, as it is at the present day, when we seat our most favoured guest on our

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\* (*Vide* Scheme—Frontispiece).

right side. The left has generally been given an inferior position, and its value depreciated. All through history, sacred and secular, the same idea of predominant superiority is given to the right hand. It is noteworthy that in ancient superstitions the spirit of evil was represented by blackness, and that of good by light—in other words, black and white; so Pythagorus, in choosing his disciples, in differentiating the good from the bad, designated the virtuous and good by a white line deviating to the right, and those with a propensity to evil by a black line deviating to the left. The Romans associated with the left side and hand fatality, weakness, imbecility, and femininity.

### Selective Influences.

Of these forces, *environment, circumstance, education, and heredity* are the main directing and determining factors.

If from some accidental starting point these influences have given the preponderance of choice to the use of the right hand over the left, it follows that, if these same



forces are utilized from early childhood to neutralize that choice, they will tend, in a very large proportion of men and women, to equalize the use of either hand. In some the element of heredity appears to assist in this development of ambidexterity. Environment and education are the two factors of success on which we must most rely.

Sir Daniel Wilson comes very near to Pasteur's demonstration of molecular effect in the asymmetrical tartaric crystal, in the polarisation of light,\* when in explaining the predominating and directing influence in the use of the right hand, he says, that "the bias with which the predominant law of dexterity originates must be traceable to some speciality of organic structure." After birth the first instinctive complex manual impulse that issues from the brain is a prehensile one. Which of the two hands is instinctively used to grasp an object presented to the infant may be determined by its asymmetry. Instinct naturally works in the direction of the opposing thumbs, so the right hand would seek the right, and the left the left. The first erect men who pushed against

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\* See page 21



each other with their hands, opposed the left to the right hand, and *vice versa*. We are still, however, in the dark as to the *why* in the advance of the race this preference was accorded to the right for prehensile and defensive purposes.

Sir Daniel Wilson is himself left-handed, using the pen in his right, and the pencil in the left hand, and unconsciously changing from one to the other. In enquiring into the gradual preference for the right hand rather than the left, Professor Baldwin made 2,187 observations on his five monthold baby. When the movements of the hands were made spontaneously, and without any violent effort, the right hand was used 577, the left 568 times, and both 1,042 times, so that the difference in favour of the right hand over the left was only 9 times. When for any reason the movements were more energetic, the preference for the right hand was marked ; only in five instances was the left hand alone used, and in 74 the right only, and in 1 both hands were employed simultaneously. Universally parents encouraged the children to use the right hand, and were averse to the use of the left. The same depreciation of the latter

continued in the early direction of all the child's actions in daily domestic life, and later on in the acquisition of writing.

### The Role of Heredity.

The force of heredity in determining the use of either hand cannot be ignored. If we see a distinct gait transmitted from father to son, or hear a special intonation of voice, which would appear to have only been acquired a few generations back, what must be the influence of inconceivable time on the predilection for the use of one hand rather than the other? Transmitted tendencies and proclivities, congenital deviations from the abnormal and disease, are questions that must be left to the speculative analyses of the philosophers and metaphysicians. Ours "not to reason why," but to accept the fact of the indissoluble relation of mind and body, and the interaction of one on the other in placing the coping stone of personality on the temporary edifice which is the man or woman of our acquaintance. In studying the mystic effects of heredity in the

transmission of psychic and physical traits, as in the obvious proofs of atavism which we constantly see, we realise the fact that this elementary influence in the evolution and transmission of physical characteristics is subject to variation. Such variations are exhibited in the prevalence of left-handedness in the offspring in certain families where there are left-handed parents, while in others similarly endowed this trait may be absent.

The difference between the strength of the right and left hand, according to Van Biervleit, is on an average as ten to nine, but this difference must depend in great measure on the occupation of the individual, for it is reversed in those who are left-handers. The same observer has noticed the varying proportion of left-handed persons as estimated by different investigators. For instance, in the University of Ghent, out of a hundred students there were twenty-two left-handed. This, of course, is altogether out of the ordinary proportion, which is only from one to two per cent.

Though we cannot dismiss the influence of heredity, we can only include it as one of the predisposing preferential causes. Of the two thousand patients noted by Dr. Ogle, eighty-

five individuals were left-handed (four and a half per cent.), and of these, twelve had a left-handed parent. Other observations convinced him that this latter characteristic was in a large number of people "sporadic," occurring singly and independently, while it was twice as common in men as in women. Mr. Jackson maintains that in at least three per cent. of births there is an incurable "bias" to left-handedness, and in seventeen per cent. to right; and that the eighty per cent. balance is normally ambidextrous.

### Pre-natal Correlation.

We know nothing of pre-natal correlation between the brain and the movements of the foetus. We do know that in the great majority of cases the child lies before birth in such a position that the left arm lies posteriorly; and it is possible that this position would give the right hand greater facility of movement than the left. Achille Comte drew attention to the result of this influence of position of the child *in utero* causing compression of the left shoulder and arm during gestation.

## The Influence of Asymmetry—Mental Polarization.

There is an influence operating universally throughout Nature which cannot be overlooked in seeking for an explanation of this original dextral preference. Asymmetry plays a more important part in Nature, both in development and growth, than is generally recognized, as was insisted upon and scientifically shown by Pasteur in the relation of the tartaric crystals to fermentation.

Until, by accident (as late as the commencement of the nineteenth century) Malus discovered the effect on light by reflection when looking through his spar crystal at the reflection of the sun's rays from the windows of the Luxemburg Palace, there was nothing known of the polarization of light. Why does one form of hemihedral tartaric crystal divert the reflected ray to the left, and another to the right? It is due, as Pasteur correctly surmised, to a *special molecular arrangement pervading the entire crystal*: a molecular distinction which he proved will cause fermentation and growth in one case, and fail to do so in another. It seems to be

a universal law that harmony in Nature is arrived at by the neutralization of opposing elements. The solution of an equal number of the two forms of crystal had no effect on the polarized ray—one neutralized the other. This principle of contrasts and neutralization of opposing forces pervades all Nature. As in the crystals or their solutions, in the instance of the polarized light, molecular arrangement in the brain may account for the predominance of the right hand over the left. Like the ray of natural light, which has no side, the cortex, in which molecular action initiates mental impulse, has, as James Hinton long ago expressed it, no definite arrangement of "scaffolding." At either side of the brain in the minute structure of the cortex, in the distribution of its cells and fibres, everything appears asymmetrical and heterogeneously arranged. But when that mental impulse is converted into concrete audible and visible speech (in writing) through the force of what we may be permitted to term "mental polarization" by the grey cells, it is transmitted in different directions according as it is influenced by the molecular medium in which it moves. As it has been clearly shown by the



most exhaustive and minute investigation that there is no discernible difference in the distribution, or in the quantity of cells and fibres of the two cerebral hemispheres, the origin of a dextral impulse must have been dependent upon those invisible selective influences which operate all through life in the struggle for existence.

## CHAPTER II

### The Brain and Ambidexterity

#### \* The Speech and Writing Centres.

It is quite needless to discuss in detail the part played by the right and left cerebral hemispheres respectively in the relation of the speech centre in either to the superiority of one hand over the other. Leading anatomists, physiologists, and clinical observers are agreed that there is in both hemispheres a centre for speech and writing ; that one can fulfil the function discharged by the other when necessity arises, as in the instance of disease or injury ; that in both hemispheres the centres for language, spoken or visible, can functionate synchronously in initiating the highest and most complex muscular movements, and can simultaneously co-operate in

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\* See Scheme on Frontispiece.



carrying out these movements, as in writing, drawing, or music.

There is nothing discernible of an organic nature in the cortex of either hemisphere of the brain to explain any functional difference, or a superiority of one over the other. Inferiority in function on the part of either commenced as a consequence of educational neglect. It may be, and doubtless is, difficult to explain, how in the remote past such neglect began, and the reason why, in the primeval exchange of an organ, which first discharged the dual duties of foot and hand, for one which was gradually used for such as a hand alone can fulfil, the choice fell on the right hand for the principal share as messenger of the will in manipulation.

The more complex these will mandates became, the greater grew the demand for variety in response in highly-specialized movements, and the greater also the interdependence of the two—the servant on the master, and, to a less extent, the master on the servant.

With more diverse human needs in advancing mental evolution, came new demands in which it was imperative that the strain of the work and familiarization with it, should fall

on one hand. It is conceivable that in these prehistoric times there may have been some universal demand in which it would have been more convenient to use one arm for holding or steadying purposes, leaving the other free to manipulate, or to assist its fellow-worker. The incipient selective influence may have been purely psychic, originating in the idea that greater manipulative or fighting power was achieved in the training of one hand, through more varied practice and experiences—some occult cerebral impulse indicating the right as the one to be educated and trained. Instinctively primeval man may have realized (as suggested by T. Dampier) the vulnerability of the heart and the need to shield it by advancing the right side in attack or defence. But here again we are searching for Owen Meredith's "maggot." Increase and complexity of demands resulted in differentiation, and this, in turn, increased side by side with the advance in intelligence. The brain, influenced through its musculo-nervous connections, issued its mandates of action or control to these progressively complex associations of movement. We see this in the infant, which, when newly born,

uses both hands alike ; and many children up to two years of age or more will do the same. Judging from Professor Baldwin's experiments, already referred to, lasting for a period of four months, it is clear that in this particular instance, up to the eighth month of life, there was no preference for the use of either hand ; also, that at first both hands were simultaneously used.

Not until greater strain had to be exerted, and with the increase of age, did the right-handed tendency show itself. Here, also, as co-ordinated articulate speech was absent, there could at first have been no active correlation between a speech centre and the hand ; though it must be remembered that the association of speech impulse and hand movement was slowly evolving under the influence of education, in listening to speech, and through the objective teaching of all the awakening special senses.

There can be no doubt that there is an intimate relation in childhood between the centres for speech and writing whether in the left or the right side of the brain, and the movements of the muscles of the upper extremity of the opposite sides. This re-

lationship becomes closer in advancing years. The call for more complex manipulative functions reacts on the centre, increasing its powers of reception of impressions and transmission of impulses. Such increase must have some influence on those intellectual forces which are usually excited to action in both speech and writing.

Thus it comes to pass that with the monopoly of these functional activities by the left speech centre, and the neglect of the right one, this disuse leads in time to concentration of the correlative psycho-muscular action and reaction in the speech area of the left side, with the result that, when there is a lesion of it, there is loss of speech and paralysis of the right side.

In the comparatively rare instance of the issuing centre being the right, the left hand discharging the associated motor functions, the conditions are reversed, and the left is the affected limb. "There is," says G. M. Gould, "no intellect, as we understand it, except through speech, vocal and written; and the instruments of this function exist only in the left brain of the right-handed, and in the right brain of the left-handed." This view is

endorsed by a number of other equally distinguished authorities.

If this be so, it becomes an important question how far we may develop intellectuality in the race by equalizing from infancy, so far as is possible, the balance of functional activity in both sides of the brain, by educating both hands to work with equal power and dexterity. Naturally, we should expect an increase in all those acquisitions which combine to endow the individual with a higher type of mentalization.

That man was originally endowed with this dual psycho-motor co-operative, simultaneous, or alternating capacity of brain and hand, appears certain. Indeed, the connecting fibre links which are found between the two hemispheres point to such a conclusion, and to a probable interchange of function under certain conditions. That this dual relationship of left centre to right hand, and *vice versa*, exists, has been proved many times by pathological evidence and clinical cases in which there has been complete disease of either centre without the classical aphasic and paralytic symptoms following it. Later on I refer to a few special instances which establish this fact.



As one hand automatically relieves or assists another in an infinite variety of purposive movements, it follows that there must be an undercurrent of communication between the *right* centre and the *left* hand. In numberless occupations this is daily occurring, apart from such special callings as violin and piano playing, weaving, typing, and others. That the left hand has had this preparatory probationership is proved by the readiness with which, even late in life, it acquires the ability to write or draw.

There are certain accepted facts that bear on the correlation of brain function and the response in muscular movement of both sides of the body which, for brevity, may be categorically stated:—

(1) The brain is a dual organ, and each hemisphere is capable of independent action.

(2) Though the left hemisphere is almost universally the one that takes command, and assumes functional activity and control, this has had an accidental origin, and is due to inherited selective influences, and not to any structural or physiological difference between it and the right.

(3) There is an intimate relation between muscle movement and surface (peripheral), sensitiveness and brain activity and culture.

(4) The speech and writing centres at either side are thus influenced by right or left-handedness, and each can, with education, discharge the function of the other, when, through accident or disease, either is rendered useless.

(5) Speech and writing involve the highest initiative intellectual processes. Both are inseparably associated with all the component elements which constitute mind.

From these axioms it is clear that early education of the two hands must have a bi-lateral effect in developing the functional powers of both these intellectual centres. Such development means greater facility of expression in language, greater retentiveness, more rapid conversion of thought into audible and invisible speech, quicker appreciation of impressions, as of size, form, weight, and colour, and the fixing of these on the tablets of memory for future use.

In the Aphasic there is an interference through some affection of the speech centre with audible speech.\* He cannot express

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† *Aphasia* (may be *ataxic*): understanding clear, but inability to convey ideas in speech; *Amnesia*: confusion in recalling words and applying the correct words. *Sensory*: word deafness and word blindness; neither the written nor spoken word comprehended.

\* *Vide* scheme in Frontispiece.

what he wishes to say, and the handwriting is also generally affected. This shows the co-ordination which exists between speech and writing. On the other hand, a person may be able to express himself in language, and yet be unable to write the words he wishes to use. To this condition Dr. Ogle first gave the name of "Agraphia." For instance, there is confusion and misapplication with regard to the names of objects and persons.

Sir James Crichton Browne emphasises the importance that attainment of the "highest possible functional activity of the hand centres, which can only be reached through the exercise of the hand, and the early exercise of the hand," bears to "general mental power." "A brain motor centre," he says, "cheated of appropriate exercise at its nascent and growth period does not develop properly." This being so, the advantage of the early use of both centres, left as well as right, is obvious. The left-handed child begins early to speak from the right as well as the left brain. It is noteworthy, as Sir William Gowers points out, "that destruction of the left speech



centre in the child (as compared with the adult) never causes lasting loss of speech, however complete the loss may be at first"; speech is regained, and before long it is difficult to detect any imperfection. Also, he says, that "as far as can be judged from present facts, by the use of both hands equally for all manual occupations, including writing, we should secure immunity from grave defects of speech," if disease of either side were to occur.

He urges that "a definite effort should be made to induce children to use each hand in writing."

Referring to such recovery of speech, Sir David Ferrier says: "This seems to me one of the clearest cases of re-acquisition of the faculty of speech by education of the articulative centres of the right side."

William James insists that "the manual training in school will give us citizens with an entirely different intellectual fibre."

### **Danger of Coercive Methods.**

Disastrous results have often followed the injudicious blunder of continued attempts to

force a child, naturally left-handed, to use the right hand in his school work and games. Such coercion defeats the very object that prompts it. Apprehensiveness and nervousness, not in writing only, but in speech also, and in the rapid and delicate execution of manipulative exercises, are induced.

This is equally true when the same treatment is pursued with the child who cannot be gradually taught to use the left hand. Such forcing methods are to be strongly deprecated in either case. When the child is very young, his right or left-handedness having been ascertained, the education that leads to ambidexterity should be gradual and progressive, from the simplest acts to the more complex ones of writing and drawing.

The ill consequences of any such forcing, whether it be physical or intellectual, are seen in more aggravated form in the nervous and neurotic child. The worst mistake is made when the "wonder child," or intellectual prodigy, is forced. Such a child often suffers from nervous troubles, as the various forms of tic, or choreic movements, or is hyper-emotional and has disturbances in his sleep, or terrors at night. These children

may have defective eyesight or a weak spine, often unnoticed, which commonly aggravates the other symptoms. I touch on these points incidentally, as it must be clearly understood that under no circumstances should any compulsion be used with such children to give one hand a preference over the other.

Dr. G. M. Gould (Philadelphia) narrates the case of a boy who was compelled "to stop writing with his left hand, and after years of torment was made a dextral writer; for forty years he has never been able to think and write at the same time. He cannot write the simplest letter that requires thought, planning, or judgment." He mentions another instance of a life of invalidism which resulted from the same cause.

The late Dr. G. A. Gibson (Edinburgh) quoted the case of a medical student who had a considerable stammer. Until twelve years old he had been left-handed. "His parents then made a desperate effort by bandaging the left arm, and such drastic methods, to render him right-handed, and from that time he began to stammer."

Another somewhat similar effect has been brought to my own notice—that of a sensitive

child who was left-handed being repeatedly punished for not using his right hand. Naturally a clever boy, he grew into a nervous and apprehensive lad, and a marked timidity has characterised him through life. In another case in which such parental harshness was shewn, a permanent stutter remained.

Dr. M. C. Schuyten has written many strong protests against this error on the part both of parents and teachers, pointing out how this right-sided preference is participated in by the eye and ear. The result is to encourage an asymmetrical development of sensation and movement, as well as general muscular asymmetry, and greater muscular power generally on the part of one side of the body.

The more important consequence, however, is the effect of this asymmetry in movement and peripheral sensation on the brain. The inevitable result is a correlative functional activity of one and inactivity of the other hemisphere, and an acquisition of preponderating psychical power of the one side. It is well to remember that this physical and psychical asymmetry has its counterpart in the nervous affections of childhood and adolescence. Muscular convulsive movements and

spasms of the *petit mal* sufferer are constantly unilateral; so are choreic movements, and those of various tics.

It is also a fact that certain obsessions commence with a unilateral impression. In the Cork Lunatic Asylum, when I was attached to it in the later sixties, there was a woman whose delusion took the form that her left leg was protestant and her right catholic. So she insisted upon keeping the former outside the bed clothes, in order to punish it for its apostasy. Such unilateral psychopathic obsessions are constantly seen in persons who are apparently quite normal in every other respect. As, for example, the man who, when he trod on a projecting stone with one foot, felt constrained to submit the other to a similar sensation; or, if he placed one hand on a very cold substance, sought to subject the other to a like impression (Grasset).

### The Speech and Writing Centres— Disposition—Temperament.

It may appear at a first and superficial glance that it is an absurd and fanciful idea



to attempt to trace any relation between ambidexterity and the evolution of character in a child. There are two expressions commonly used in speaking of children, and particularly of the growing child in the pre-pubertal and pubertal years, namely, "temperament" and "disposition." So far as the individual boy or girl is concerned, momentous issues depend on the group of ideas which those who have the rearing and charge of the child associate with the practical application of these terms. The natural tendencies to follow certain lines of conduct and action; to be influenced variously by different pleasures and pursuits; to be controlled by propensities which have moral or immoral, harmless or harmful, sources innate in the mental constitution of the child or youth, we regard as his or her *disposition*. It is a heritage that we carry with us all through our lives. Its influence touches all our feelings and emotions; with many it involves a lifelong struggle, in which numbers go under, and only a comparative few come out successfully. It shows itself, oftentimes, in strength of will, determination and ready subjection to discipline. We see it in the apprehensive and vacillating; we shun it



First year of left-hand drawing. Age of pupil, 16.



Left-hand drawing. Age of pupil, 14.





in the choleric and passionate ; we pity it in the feeble and purposeless ; we admire it in the active and energetic ; we cling to it in the sympathetic, self-sacrificing, and loving.

This is *temperament*. It has often, as we all know, its physical accompaniment in bodily conformation, features, expression, gestures, and even in such associated muscular movements as speech, writing, and gait. It is a prominent fact in natural selection, and in the transmission of attributes, which it is all important to recognize in directing the evolution of the offspring. Let us seek first in that unfolding to understand temperament, and then we may hope successfully to direct and shape disposition.

We cannot commence too soon. In the early years of life such temperamental tendencies and traits are evident in most children. Every element, psychical or physical, in that evolution which tends to develop self-control, the mastery of obstacles, the bringing of inclination under the dominion of will ; to impress the maturing brain with the advantage of correct system and order ; to inculcate the idea and importance of motive in the

attainment of an object, has its moulding and plastic influence on the psychic and moral side of the child. Out of the colloid emerges the crystalloid, and we know not the subtle influences which tend to crystallize out of temperament and disposition the shape which the character of the future man or woman finally assumes.

### Character-Intellectuality.

"It is plain," says Sir J. Crichton-Browne, "that the highest possible functional activity of these hand centres is of paramount consequence, not less to mental grasp than to industrial success." As Bain long since said, "We cannot bisect a man's intelligence." No more can we separate that intelligence from that complex entity which we call *character*, and into the formation of which enter all the component elements of the *ego*, psychic and physical. It is this same character, slowly evolved out of accumulated experiences, and built up out of the yieldings and resistances of our wills, which is the only enduring inheritance that can survive

the final dissolution of the corporeal habili-  
ment from its immaterial tenant.

We are too apt to forget to teach children in their earliest years that their bodies are hallowed temples, and that the foundations having been once laid, the Eternal Architect confides to their own hands a great part of their building and completion. That temple, during its temporary occupancy, is so constructed and endowed as to influence for good or ill all the attributes of its mental tenant. That invisible occupier developes in time to be what we term *Character*.

As unremitting effort is the first essential in the building of a solid reputation in any calling, pursuit or accomplishment, it is an important educational step in this direction. Preciseness in execution and attention to detail are indispensable if we wish to reach a degree of success in any work which is to be of a complete or permanent nature ; and this is just what is encouraged in the acquisition of simultaneous two-handed writing, drawing, and technical work.

Let anyone try it for the first time, and he will realize the amount of will power and control, with the concentration of mental effort,

that is demanded in order to bring the dis-used brain centre into harmonious operation with the motor manipulative impulses in the hand it controls, while maintaining a distinct harmony and correlation in time, force, quantity, and quality of the crossing impulses from both sides of the brain which are there working simultaneously.

Self-control, one of the triumvirate of forces in whose hands Tennyson places the cup of "uncalled-for" power, is straightway exercised, and its coadjutors, "self-reverence and self-knowledge," are too intimately associated with it in the achievement of "living by law" not to be thereby indirectly, if remotely, influenced. And so we are irresistibly brought into touch with the moral side of that "law" which demands obedience to its precepts; and we are prompted "to follow right, even in the scorn of consequence."

Intelligence and moral excellence are not at all times handmaidens, and we often find moral depravity linked with intellectual power. Here the intelligence is prostituted by its subservience to forces which coerce the will, so that it ignores what it knows to be right, and follows the wrong, *Consequence becomes*

*the main-spring of action.* Still, looking back on history, we find that the intelligences which have generally contributed to the building up of the moral precepts and tone of the social edifice have been those of men to whom the race is most indebted for its scientific discoveries and social advances. Every factor that contributes to the formation of character and intellectual growth must have its place and part in the moral constitution of the man or woman. Ambidexterity is one of these.

### Ambidextrous Nations.

Mr. Jackson quotes from Sir Isaac Newton, who instances the ambidextrous Scythians as an example of a people "inured to labour, fierce in war, of prodigious strength," with "great control over their passions." "Theft was so severely punished" that their flocks might wander freely abroad unmolested. They were described in the ancient classics as a marvellously long-lived race (1220 B.C.), capable of great endurance, and noted for their virtue. Thucydides said of them that "no nation either in Europe or Asia could equal

them for strength, valour of conduct." The women-folk were equally brave as the men.

It is remarkable, be it a coincidence or otherwise, that here was a people whose laws enacted that they were to be trained to the use of both hands equally. The fact stands out as a striking instance of an ambidextrous race.

The ancient Egyptians [in that marvellous, many-sided civilization of which we only know the period when it had already considerably advanced (4000 B.C.)], in their paintings, sculpture, architecture, and the mechanical trades of the country, show inherent evidence of a prevalent ambidextrous faculty in the people. Of modern nations it would appear \*that a large proportion of Persian workmen are ambidextrous, and the left hand is commonly used for the signing of letters or documents.

But the most striking example of ambidexterity in a modern nation is to be seen in the Japanese. Ambidexterity is taught in their schools, and practised in all their arts. The trait runs back to the remotest history of their race. The gift is equally possessed by both sexes.

Apart from the exquisite artistic taste and

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\* "Ambidexterity," p. 115.



colouring of their painting, the Japanese, of all modern nations, exhibit the most wonderful craftsmanship and manipulative skill. This is shown in their originality in designing in an infinite variety of subjects, the most delicate carvings in ivory ; their marvellous lacquering and gold ornamentation ; the ingenuity and endless variety of their ivory work, with its imperceptible joinings ; the beautiful inlaying of their woodwork, as also in gold and silver ; their unsurpassed embroideries and lace work, their tortoiseshell and silver enamelling, not to mention their sculpture and their brass and copper castings. All this manual dexterity has continued side by side with the most extraordinary rapid progress in the acquisition of Western learning and scientific knowledge that the world has ever known. The Japan of to-day, in all that appertains to science and intellectual thought is quite a different country from that of fifty years since.

### Effect on Character.

This insistence on a subtle relationship existing between ambidexterity, during its



acquisition by the developing mind, and an influence on the moral character of the individual child, may appear strange and far-fetched. If we revert to the days of our own childhood, must we not admit how intimately interwoven with our propensities, tastes and distastes, emotions and feelings, resolves and yieldings, were the occupations and duties in which we were at the time engaged? The farce or tragedy of a life is often decided when a parent or guardian, through the force of domestic exigency, finds it *expedient* to place the youthful voyager on board the first vessel that happens to lie convenient in the harbour of Destiny, and the anchor is weighed for the journey of life. There is no sadder proof of the forcible truth expressed by George Eliot when she wrote of "the damnable doctrine of expediency" than when we find expediency and exigency diverting the triple current of instinct, talent, and resolve that works life's millwheel, directing it into some sedgy backwater of utility. No more mischievous inference is constantly urged in defence of motive than that embodied in the proverb "Necessity has no law." *The paramount law of necessity is effort*, and in

nothing in life is obedience to its enactments more demanded than in the determination to fit the aptitudes and gifts of the young mind to the calling in life to which it is put.

Let it be granted that in the majority of children exceptional capabilities are absent, and the little piece of human putty is used to meet the first sign of leakage in the family pane or pipe. Immeasurably sad it is to reflect at what a cost to the individual and the race are such casual decisions arrived at. Natural tendencies and aptitudes count for nothing; and *utility* is the all-inspiring motive that turns the balance in the decision as to the future of the boy or girl.

It may strengthen the influence that ambidextrous training must exert on character if I quote a few opinions which directly bear upon it :—

The late Professor William James said:—

“The most colossal improvement which recent years have seen in secondary education lies in the introduction of the manual training schools; not because they will give us a people more handy and practical for domestic life, and better skilled in trades, but because they will give us citizens with an entirely different intellectual fibre.”

Sir James Crichton-Browne wrote in 1888:—

“As the hand centres hold a prominent place among the motor centres, and are in relation to an organ which in prehension, in touch, and in a thousand different combinations of movement, adds enormously to our intellectual resources, besides enabling us to give almost unlimited expression to our thoughts and sentiments, it is plain that the highest possible functional activity of these hand centres is of paramount consequence, not less to mental grasp than to industrial success”

Sir J. A. Cockburn says:—

“Manual culture was first advocated because it taught the use of tools and encouraged physical development, but those who pioneered it builded more wisely than they knew, and it is found to-day not only to fulfil those useful functions, but has become recognised as the best form of mental and moral education. . . . And further, if you want to develop the brain effectually, you must have recourse to that method by which the evolution of the individual and of the race is accomplished. You must do it through the motor function, through the muscles of the hand, which is the chief agent of human activity. Not only is this the way to reach the intelligence, but it is also the best way to build up character.”

And in speaking of the nascent or development period of the hand centres, Sir James Crichton-Browne says further:—

"It probably extends from the end of the first year to the end of adolescence, but there can be no doubt that its most active period is from the fourth to the fifteenth year, after which these centres become comparatively fixed and stubborn."

With regard to this fixation point, however, I personally know of instances in which in middle life excellent manipulative power has been acquired by the left hand; in one instance after amputation of the right.

And if we take an opinion of the correlation of manual dexterity to morality, I may quote the view of an advocate for the right hand. The late Sir Charles Bell says:—

"Man is the first of the animals, not because he possesses a hand, but rather that he has a right hand. I consider the preponderance of the right hand not as the cause of the superiority of man, but as the immediate consequence, as the most eminent sign of his *moral* pre-eminence."

Dr. Manfred Fraenkel ("Ambidextrie," par Varia Kipriani, 1912, p 39), who has made a careful study of the clinical effects of various exercises on certain neuropathic effects, writes:—

"L'homme développe l'une de ses mains aux dépens de l'autre. Il est dépouillé ainsi, sans s'en clouter, d'une partie de sa puissance spirit-

uelle ; il a perdu un bien précieux, et la gravité de cette perte augmente à mesure que, comme c'est le cas de nos jours, on demande davantage à l'hémisphère gauche, à mesure que celui-ci se fatigue et s'use, à mesure que grandit le désir de lui alléger sa tâche. Aussi n'y a-t-il rien de plus justifié que ce desideratum : exercer la main gauche, la rendre utile et, avec elle, l'hémisphère droit. L'ambidextrie, devenue le bien commun de tous les peuples civilisés, donnera non seulement le moyen de tirer de leur nuit mentale beaucoup de malheureux, mais elle nous ouvrira à tous des voies nouvelles vers une lutte pacifique dans le domaine des idées ; elle sera le point de départ d'une nouvelle vie de l'esprit dont la grandeur fera vraiment époque et qui présentera peut-être des nuances encore insoupçonnées."

The same authority quotes cases in which power of speech was regained by systematic writing with the left hand where there was paralysis of the right side, and, even when a second stroke occurred, speech remained, proving clearly the transference to the right brain centre by left hand writing of the power of speech. And in another still more extraordinary case, a boy who lost his left hand, and had to substitute an artificial one, suffered when he arrived at the age of thirty, from paralysis of the right side with loss of speech.



By means of a wooden ring furnished with a pen drawn over the forefinger of his artificial hand he gradually learnt to write, and finally not only recovered the use of his native tongue, (German) but also his former knowledge of Russian and French\*

A most interesting communication by Dr. Thomas Williams, of Washington (U.S.A.), dealing with the treatment of those who are pre-disposed to inebriety, was read at the Mississippi Valley Medical Association in October, 1911 (*Medical Press and Circular*, February 8, 1912). It has an indirect bearing on this subject, for it exemplifies in the adult what I am desirous of impressing in the case of the child, viz., the beneficial influence on the mind and vicious tendencies through mental concentration on physical acts and manipulative movements which require attention, memory, and a certain degree of dexterity in their performance. "It is," he says, "merely a mental and moral gymnastic." These exercises were mainly introduced by Vittoz, who successfully treated various forms of mental weakness by this method.

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\* *Vide* scheme in Frontispiece and Page 33.

There is a counteracting suggestion of an inherent power of will to overcome previous failure of resolve. I have only space to give examples of two days of these weekly exercises for obtaining mental control.

"The important matter is not the exercises themselves, but the way they are done. The greatest care must be taken that the maximum of attention is paid by the patient to the particular exercise he is doing, in order that the power of concentration may be practised. This, however, is only a subsidiary factor; for the real essential is the actually increased power of self-control.

"Each must be done with the greatest intentness and exclusive attention while quiet and alone. About ten minutes every two hours during the day should be devoted to the work.

"*First day*—(1) For concentration in the control of movement: Bend the left arm very slowly with full consciousness of each movement and by willing the act very clearly. (2) For concentration upon impressions of touch: Take in hand a marble, eyes closed. Think of it: (a) size, (b) contour, (c) smoothness, (d) consistency; each separately. (3) For concentration upon impressions of hearing: Listen to the tick of a watch for thirty seconds as to—(a) loudness, (b) musical note, (c) regularity, (d) grouping of sounds into series. (4) For concentration upon impressions of sight: Look at



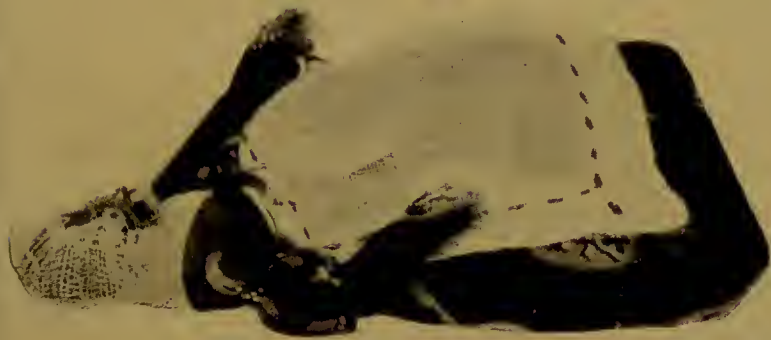
a marble, thinking of the various properties ascertained by touch, as well as its colour.

"*Second day*—(1) Bend the right arm very slowly with full consciousness of each movement and by willing the act very clearly (2) the same as (2) above, substituting a cotton reel for the marble. (3) Listen to the street car as to the same qualities. (4) as (4) above, substituting a cotton reel for the marble."

The left leg, the right leg, movements of the trunk to right or left follow on consecutive days, and other objects, as a bottle or pencil, are substituted for the marble or reel of cotton. If permanent benefit can be derived from such practices in the adult, how much more may we expect to achieve during the plastic period of the child's developing years. How frequently do we not see the young boy or girl casually treated, or even unnoticed, who is showing the incipient symptoms of chorea in slight involuntary movements of the eyelid, the eyeballs, the head, or shoulder; of tic in some painless spasmodic twitching of the facial muscles; the first warning in some spasm of the arm and transient sensation which the child cannot describe, of approaching *petit mal* that may develop into epileptiform seizure; the com-

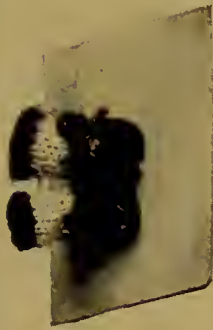
mencing rigidity of the neck muscles and inclination of the head to either side that heralds the future wry-neck. Yet all these abnormal neuro-muscular conditions have usually behind them an individual organization, with distinctive mental features, in aptness or dulness, precocity or backwardness. sensitiveness or indifference, and often-times an attendant moral obliquity which resents control, and seeks release from it in the abstraction secured by the indulgence in some vicious propensity or immoral habit. The hideous blunder is even sometimes made of only dealing with such psycho-physical phenomena by the infliction of some mental and physical pain. The effect is almost invariably to aggravate it. Beside whatever hygienic or therapeutic means that may be taken to build up and give stability to the constitution, correcting any systemic fault, the first aim of parent or teacher should be by observation of the special temperament and disposition to arrive at the best and simplest way of inculcating will-control.

This means the dual sway of brain and conscience over the "lower passions and lower pains," the haltings and retracings of the



1

Illustrations about  
natural size of  
models.



3



2

These models were made and worked by a lady who was born with only a left hand; they were done when lying in bed ill in a Nursing Home.  
(Her handwriting is on next page).

(2)



5

Left-hand writing of same lady.

Through the sufficiency  
Of 'sabb and then 'How shall I bear  
The burden of tomorrow,  
Sufficient for the day the Lord  
Has burdened & he sorrow;  
Strength sufficient by the way  
Sufficient for the day.  
I was found in  
General Gordon's Room.

With cards and  
the Season's Greetings

4

(1) Effigy of witch—the face made from the seed of a Snap-Drum, the coloured clothes minutely worked; (2) Mouse-trap with mice playing about and a mouse inside; (3 and 4) Babies' Shoes beautifully knitted; (5) Set of cardboard boxes.

(3)

young traveller at the onset of life's journey. There is abundant evidence that in the psycho-physical education involved in the teaching of ambidexterity we have a powerful aid in bringing about this self-reliance and control.

The relation of neurasthenia to bodily fatigue is but another example of the effects of the overdoing of either the mental or physical side of the growing child. Especially is this true of the girl developing into puberty. Work which taxes to the utmost one side of the brain and body, with little call on the other, and carried to unwise lengths, or continuously persevered in under unhealthy conditions, is characteristically that which fosters neurasthenia, and neuro mimesis (nerve mimicry). Hence, experience proves that all games and exercises "which demand the simultaneous symmetrical or successive movements of the muscles, are the most powerful means of producing harmonious action throughout the organism, in the combatting of neurasthenia and other nervous and physical affections" (Varia Kipriani). We see the evil consequences of asymmetrical exercises, and the prolonged assumption of various attitudes in the different kinds of cramp which these oc-

cupations induce, as in the case of writers, violinists, pianists, telegraphists, tailors, dancers, and others. Relief from the strain and temporary rest, with resort to symmetrical physical exercises, are our best means of restoring the normal physiological function to the affected limb.

twelve and the top of

Mirror Writing. ("Ambidextrie").

A dam barrier with four rows  
was found the third a dam-over.

Left-hand mirror writing after a few days' practice when the right hand  
was injured.





## CHAPTER III

### Ambidexterity in Relation to Writing, Drawing and Music

#### Ambidexterity in Relation to Writing.

In *Writing, Drawing, and Music* we have synchronously called into action various mental faculties (so called) and processes—these are cognition, memory, conception, ideation, perception, sensation, emotion, and, as forming a connecting link between all, attention. Let anyone sit down to write a thesis on some event in which the scene and surroundings of his or her childhood's days are recalled, and it will be quickly realized how each of these mental attributes is brought into play: how automatically the hand transmits to the paper in *visible speech* the complex thoughts of which they are comprised. In their transmission, the senses of sight and touch are

mainly employed, though past impressions of hearing, smell, and taste may also be recalled, whether in the word picture or the actual painting. In all these arts—writing, drawing or painting, and music—language, with the construction of words, is an inseparable mental accompaniment, though the words be not spoken in actual speech. The will, while cognizant of the impression, does not issue the mandate to the speech muscles, which, by co-ordination of action, would otherwise obey the impulse and express audibly the ideas that the brain conceives. It must be conceded that of these highly-specialized acquisitions, handwriting is the most universal. “It is,” said the late distinguished anatomist, Professor D. J. Cunningham, “the highest and most intelligent form of muscular function and exercise—the crystallization of the best thought and intelligible conception of man into visible speech.”

We can go back to our own earliest impressions of our caligraphic efforts—strokes and pothooks, and emergence into letters and monosyllabic words. How mixed up with these attempts were the disappointments at failure, the feelings aroused by the condemn-

Zurich, a lake town and cant

Multiplicand the quantity to

Class B. First Prize. Age of writer, 11. (Reduced one-half).

Clara C. C. C.

Class D. First Prize. Age of writer, 8. (Reduced one-third).

Left Hand. SIMULTANEOUS TWO-  
HANDED WRITING.

Right Hand.

The Belief The Lord's Prayer

I believe in God the Father  
Almighty, maker of heaven  
and earth. And in Jesus  
Christ His only son our Lord

Our Father which art in heaven  
Hallowed be thy name. Thy King-  
dom come. Thy will be done  
on earth as it is in heaven Give

After a few months' practice.

Age of girl, 16. (Reduced one-half.)  
(5)

("Ambidexterity")



ation or encouragement of our teachers, the determination to succeed; and with what a large part of our early childhood this learning to write, spell, and read was filled. It was an early discipline which worked for good—one of our first lessons in "*perseverance in effort*"—Pasteur's motto. Had we been then taught to use the left hand equally or simultaneously with the right, these impressions would have been more permanent, and the education in exercise of will and the discipline of effort far greater. It would have made us more persevering and the consciousness of success would have acted as a stimulus and encouragement to face other more dextrous feats of skill. These effects would have been still more accentuated had we been finally taught reverse (mirror) writing with both hands\*

The correlation which may exist between the character of a person's writing and his mental condition, or the state of his bodily health at the moment he is writing, has been made the subject of minute investigation from time to time. And it is indisputable

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\* See Plate 4.

that in certain mental states the character of the writing is materially influenced. Those who have made graphology a study believe that the type of writing—as, for example, whether it be vertical, serpentine, rectilinear, clear, regular or irregular, marked by flourishes, pointed, crowded, or distinguished by various other caligraphic characteristics—is indicative of certain qualities possessed by the writer. And there would appear to be a substratum of truth in this view. The claim is made that handwriting is an index of intellectual capacity and different moral attributes, in addition to those in which imagination and sensibility play an important part.

If during the changing circumstances and the various phases and moods of a man's life we examine his handwriting, we shall find that there is in it considerable variation present during such vicissitudes. One of the most remarkable instances of this occurs in the signature of the first Napoleon, not alone in the character of the individual letters, but also in the upward or downward slope of his signature.

An interesting work by J. Crepieux-Jamin (“*L'Écriture et le Caractère*”), translated by





From photographs of young girls shewing spinal curvature due to wrong posture in school work or otherwise. (Author).



Tablet made by left-hand worker.

For this photograph I am indebted to Mr. Robert Hilton,  
Founder of the Keswick Technical School.

remaining unchanged. There is thus rapid co-ordination between the sight sense and delineation by touch, with muscular movement, as seen in chalk and freehand drawing generally. The method is not adapted for various degrees of small writing or decorative writing, when the finger movements are indispensable. The teaching of the child may be transitional, the first stage being devoted to the free arm method, and then that by the finger and thumb following. Here again, we find both the speech centres working in harmony with those of sight and touch; the ambidextrous child, so taught, is employing all three, and there is simultaneously an increase of exercise of will power in co-ordinating and harmonising all these functional activities.

Since the teaching of spelling accompanies that of writing, and as at this early period both speech centres are equally free to receive impressions and issue co-ordinating impulses to the muscles of both upper limbs, this would appear to be the time of election to educate the hands to work synchronously in simultaneous accord with both centres.

A most interesting brochure has been recently written by Mademoiselle Varia Kipriani,

Secretary of the *Revue Psychologique*, included in *Travaux de la Faculté Internationale de Pedologie*, under the direction of Mlle. Prof. le Docteur I. Oteyko, who was Secretary-General to the first International Congress of Pedology. In this the whole question of ambidexterity is discussed, and it is well worth perusal by all interested in the subject. It includes the influence of writing and posture, whether the latter be assumed to the right hand or left, on certain affections which follow from the ill effects of various occupations—the different types of cramp which are incidental to diverse callings, as, for example, writers', musicians', telegraphists', dancers', tailors', clockmakers', in which constrained attitudes and positions are assumed; also in the inducement of various forms of spasmodic tic; in choreic movements and in lateral curvature of the spine. There are valuable comments on the correlation between this latter deformity and shortsightedness, as in the frequency with which this refractive error is found in students and literary people. There can be no second opinion as to the vital importance of attention to the position of the body of the child and

growing youth during both writing and reading. And in the prevention and treatment of spinal curvature, and the regulation of the attitudes of children at the desk or table who have any refractive troubles of the eye, such supervision is essential.

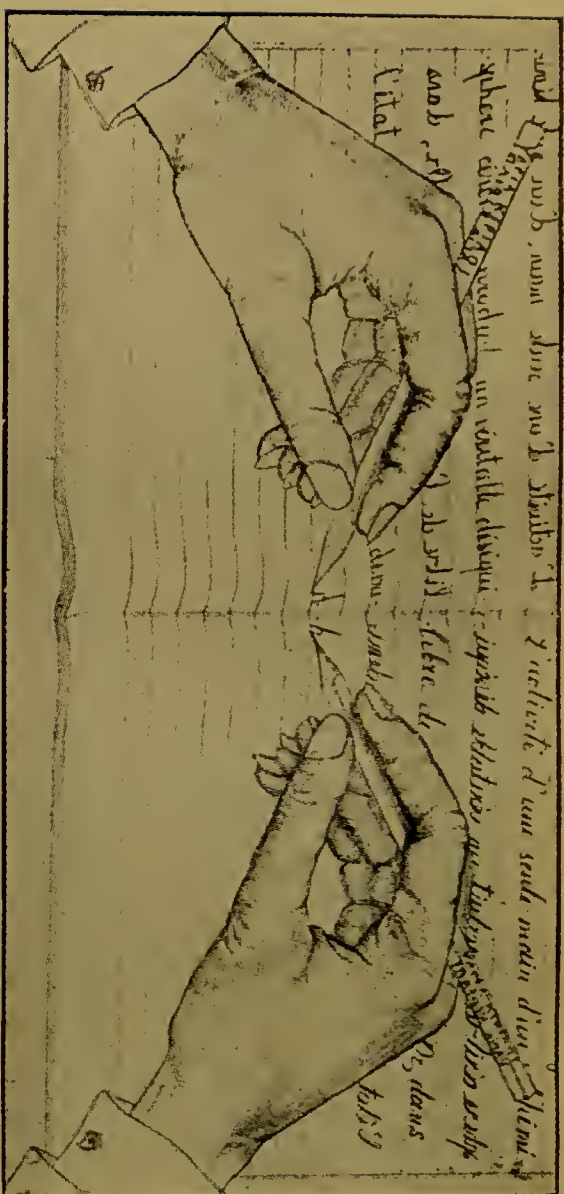
We need not stay here to discuss the disputed advantages of the bent or erect position assumed in reverse writing. An interesting fact has been recorded by Professor Soltman (*loc. cit.*, p. 56). He made a large number of children write with the left hand; of 200 of these, apparently healthy, he found that a certain number wrote in mirror (looking-glass) writing, in which every letter of the word is reversed. All the latter had some neuropathic disorder. Among 200 sick children only those who suffered from a nervous affection used inverse writing; children in good health usually tried to write from left to right with the left hand, so that they could read the writing.

Children afflicted with some nervous disorder arising from a cerebral disturbance have a tendency to write inversely. So much so is this the case, that Professor Soltman regards inverse writing as an implication of some





Pupils in Madame Michel's School practising ambidexterity and writing with the left hand, under Mlle. Dr. Varia Kipriani. ("Ambidexterie"—Varia Kipriani).



Position of the pen as held either in consecutive or simultaneous writing.  
(Varia Kipriani).

mental abnormality. There is evidently much still to be learnt of the relation of the handwriting, whether ordinary, reverse, straight, or mirror, to the mental state that predisposes to it.

Dr. Lande (*loc. cit.*, p. 58) found mirror writing more frequent in abnormal than in normal children, whether these were left-handed or ambidextrous, and in a greater proportion of girls than boys. In the school under the superintendence of Madame Michels, the girls are taught to write with both hands alternately in the ordinary incline of the writing and in "mirror," while the pen-handle is held between the middle and forefinger, and the body is not inclined to either side. The method is shown in the illustration page 66.

### Vertical Writing.

Mr. Jackson in his "Theory and Practice of Handwriting," and in "Ambidexterity," is an ardent advocate for vertical or upright writing. He quotes a number of authorities and teachers who are unanimous as to its greater legibility, rapidity of execution, and



the ease with which it is learned. It has been recommended by International Congresses of Demography to be taught in elementary and secondary schools.

Perhaps the most striking example of the change from the sloping character of the writing from left to right, to the vertical, is shown in the writing of Lord Nelson after he had lost his right arm, when he quickly learned to write with his left hand. His signature before and after the loss of his arm is reproduced on p 94.

From the hygienic point of view there is no comparison between vertical and slanting writing as regards the effects on the spine, chest and respiration. Many young children, both near and far-sighted, are astigmatic—that is, they cannot bring vertical and horizontal lines, or those at various angles from the vertical, to a focus on the retina. This results in a want of acuteness of vision, and a blurring of objects, necessitating the use of glasses. Inclination of the head to either side in such children, the more so if it be continued for any length of time, is distinctly injurious, and must to an extent interfere with the optical correction.

Astigmatism leads to eye-strain, which is a common cause of headache, and hence comes inaptness in work and study, frequently associated with a train of nervous symptoms. The growing boy or girl becomes the neurasthenic man or woman.

I have not referred to ambidextrous work in the case of the blind. Mr. T. H. Martin, Superintendent of the School for Teaching the Blind, at Swiss Cottage, very kindly gave me an opportunity, through the headmaster and mistress, of ascertaining these facts. Out of forty-three boys there were two left-handed—one had the right arm paralysed; they were aged 11 and 9 respectively. Both were intelligent; the elder of the two is particularly smart. There was one left-handed girl among thirty-four, also a very intelligent child. Both hands are used in reading; one, the right, is the *guiding*, the other, the left, the *reading* hand. Here the right speech and writing centre must be always in action. There is in all the children the tendency to use both hands equally in manipulative work.

### Ambidexterity in Relation to Music and Drawing.—Jacques-Dalcroze System.

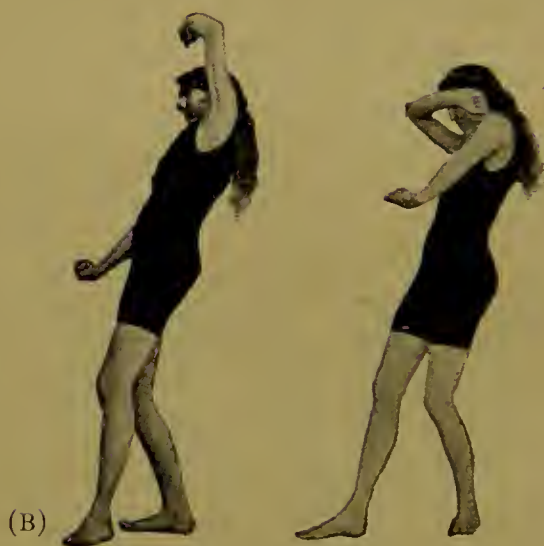
Bain regarded the musical brain as the one in which, more than any other, the greatest number of acquisitions are stored. When the musician in his "songs without words," through musical chords, evokes the ideas and nervous impulses that are associated with various natural phenomena or manifestations, adding to these the pathos of sorrow and despair, or emotions of love and jealousy; the stimulus of anger or courage, we can conceive how complex are the evolutions of thought, all linked with language, which are transmitted through the notes and chords he strikes. Still, a skilled musician must use with equal deftness his right and left hand, and will automatically continue to use either, even though he be carrying on a conversation, or reading the score of an opera.\*

In touching upon music in connection with ambidexterity, I must say a few words with regard to the "Dalcroze Method," which has been introduced and taught by Jacques-Dalcroze at Hellerau. "It is," says Mr. John Harvey "the re-discovery of an old secret,"

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\* See Note page 97.





Beating  $5/4$  canon without (A) and with (B) expression.



Rythmic movements for the semibreve.





recognised by Plato, who emphasised the principle of the need of *rythmic action* in the whole life of the man.

It would not be difficult to show that harmony, in the correlation of the discharge of function of the various organs in the human body, depends on the rythmic regularity with which their functions are discharged. To prove this, I need only instance the organ in the normal rythmic movements on which the health of the rest depends, the heart. The attainment of rythm here involves normal rythmic nerve action, healthy rythmic changes in the constituents of its blood supply, rythmic regularity in the expenditure of nutritive force, which is alternately replenished and exhausted in the heart beat, the nicest balance in the rythmic filling of its chambers and the force employed to empty them through the muscular power of its right and left sides ; also, the relation of all these rythmic actions to the respiratory rhythm in the lungs, and the need for complete harmonious correlation to maintain healthy breathing.

Quickly the brain reacts to any slight disturbance of this rythmic regularity. And as it is dependant upon the heart for its blood

supply, so is the rythm of the latter organ on the brain and nervous system for its continuous action. It is a matter, as elsewhere all through corporeal life, of give and take—physical and psychical rythm maintain the normal physiological discharge of function. This is but an extension of the universal principle of action and reaction found operating in all nature. Look where we may, we find the impulse to overcome the first necessity for continuance of existence, from the amoeboid cell to the planet. And this is as true of the psychical and moral as it is of the physical. To obtain rythm in character there must be struggle.

Jacques - Dalcroze, in his system of Eurythmics recognises the inter-dependence between automatic muscular movement and the harmony of sound. The initial element in tone is the length and character of the sound vibration. Time is necessarily involved. Tone is primarily dependent upon these two factors—length and rapidity of vibratory wave. Realising this, Jacques-Dalcroze advocates the importance of teaching young pupils the value of time and rythm before they learn music.

This is done by the acquisition of automatic movements, from the exercise of marching to time in earliest childhood to a great variety of simultaneous rhythmic movements of head, arms, and legs, which, with the knee bent, are indicative of time, beats, expression, and pauses. So varied are these exercises that they meet every form of combination in the music, while the pupils are so trained that on the pronunciation of a single pre-arranged word, "*hop*," an instantaneous change of movement in the exercise is made, indicative of the alteration in the musical key and expression.

### Physical Movement and Mental Response.

Every physical movement involves mental output on the part of *both* hemispheres of the brain, and the exercise of all those faculties of the mind which are employed in music, both vocal and instrumental. The teacher of these exercises early recognises how different children vary in their powers of observation, attention, concentration, memory, and rapidity of physical response to mental

impulses. So, also, any physical defects in movement, balance, muscular weakness in limb or spine, are made apparent. My object in this short reference to Jacques-Dalcroze's Eurythmic Method is to emphasise its great value in developing the correlation of muscular movement, touch, and sensitiveness of both sides of the body to either side of the brain. Physical action and mental response go hand in hand together. It must come in as a valuable aid to the teaching of ambidexterity. With this latter it is an additional incitement to voluntary effort to follow system, to attend to detail, to have an aim, to overcome and to persevere. Ambidexterity and eurythmics are both tributaries that help to form in the developing child the great central current of character, as they alike necessitate perseverance and self control.

If in the education of the child we follow, in the order of their relative adaptability to age—first, teaching by peripheral sensitive impression; \* secondly, a harmonising of these sensitive impressions, by various musical sounds, with definite muscular movements, in which the limbs of both sides of the body are used simultaneously or alternately; and, in

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\* See the Montessori System, p 79.

the third stage we introduce the employment of either hand in the early learning of writing, we necessarily have these results. In the first stage we bring the peripheral impressions of each sense into harmonious relation to all the others, and all separately or conjointly into action with brain cognition. In the second, we bring such central nervous perceptions and issuing impulses into a harmonious association with muscular action all over the body. In the third, we teach the evolution of intelligent thought in developing synchronous exercise of both in the discharge of their highest function—the conveyance of invisible into visible speech, and the transmission of intellectual thought into visible language.

We have in all these stages co-ordination of psychic with physical action.

It would appear from the writings of his contemporaries, Gabba de Castiglione and Raffali de Monteluppo, that Leonardo de Vinci wrote in mirror writing to baffle the curiosity of those who would pry into his secrets or discoveries; it is, however, much more likely that he wrote with equal facility with both hands, and also reverse writing.

Sometimes he reversed the letters of the whole word—"Amor" for "Roma", "Ilopan" for "Napoli". Also, he imitated the "*boustrophodeon*" of the Ancient Greeks, in which the alternate lines were traced from right to left and from left to right, as seen in what is regarded as the most ancient inscription of this kind of writing in the ruins of the temple of Appollo Amycleen, and that on the column of Sigee, erected to the tyrant Phanokidos, which was brought from Troy to England.

In Leonardo da Vinci all the poetical, philosophical, mathematical, scientific, artistic and musical talents appear to have been united. His friend, Luca Pacioli, says of him:—"He could draw with that ineffable left hand of his a line firmer and truer than has been drawn by the hand of any other man excepting, perhaps, "Albert Durer." Hans Holbein also used his left hand freely in painting. I refer elsewhere (p 93) to Landseer's ambidextrous power in his simultaneous drawing of different objects with both hands.



## CHAPTER IV

### The Montessori Method and Ambidexterity

#### The Montessori Method. \*

The Montessori system of education of young children is now so well known in England that it is unnecessary to explain in any great detail the method advocated by its talented originator. To those, however, who may not have studied these details, a few explanatory words are necessary in alluding to this system in its relation to ambidexterity. Miss Maria Montessori is a graduate of medicine of the University of Rome, and teacher of Pedagogic Anthropology in the

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\* The Montessori Method by Maria Montessori. Translated from the Italian by Anne George. With introduction by Prof. Hay Holmes. W. Heinemann, London.



University. She has studied Experimental Psychology in all the Italian Universities, and has devoted her life to the training and education of feeble-minded children. As assistant physician to the Psychiatric Clinic of the University of Rome, she has had for fifteen years exceptional experience in the teaching of idiot children, as also through her visits to various insane asylums. Stimulated by Itard's and Seguin's didactic methods, in which instruction of a mechanical nature was linked to that of a psycho-physiological, she conducted a number of experiments, and succeeded in preparing a number of "idiots" for examination at a public school, which they passed successfully. Seguin realised the advantage of imbeciles maintaining equilibrium in their movements side by side with the cultivation, first of the sense of touch, and, finally, of all the senses. With Froebel, Dr. Montessori aims at the evolution of the child's inherent psychical and physical powers by allowing a greater freedom of action in relation to his environment, and encouraging him to call on all his innate activities, and to bring these into a spontaneous and harmonious relationship to



Telling objects by weight.



Children learning letters by touch.



Playing game with tablets of coloured silks.



Child of three and half learning to button with button frame—on other frames they learn to lace and tie ribbon bows.

his developing mental and physical attributes.

She founded the "Children's Houses" for the teaching of normal children in the poorer quarters of Rome, and the effect of her system in the Houses in these localities has been remarkable, both in the moral and educational results, not only on the children, but on the entire family life. These have been followed by the establishment of similar Houses in Paris, America, and elsewhere. The very youngest children are minutely instructed in ways and habits of cleanliness, and the carrying out of all the details of their daily life, as well as their various exercises, without any coercion—every act is voluntary and spontaneous. In short, as she herself says, her educational aim is "to aid the spontaneous development of the mental, spiritual, and physical personality."

There are many points in the elaboration of this principle of freedom of action and wide liberty which is at the root of her system in its practical and universal application that are open to discussion, and the opinions of teachers may vary greatly as to its merits. While fully recognising the force

of these criticisms, I do not propose to touch upon them here. My entire object is to refer very briefly to her didactic methods, and the advantage of ambidextrous training in teaching these. They are utilised in stages according to the age of the child, and are divided into five grades, but each has these principles for its foundation. First, that each sense, while it has its own independent functional power, is ever associated in harmony with all the others in the conveyance of impressions to the brain, and in eliciting intelligent thought. Second, that the education of the senses must proceed, *pari-passu*, with the child's capacity to store mental acquisitions in the developing brain. All are exercised by resort to the use of various stimuli which appeal to the mind by contrast. Thus, the child begins with the education of his sense of touch (tactile); discrimination of degrees of temperature (thermic); estimation of differences of weight (baric). He then passes on to the recognition by touch of shape and form (stereognostic); the education of visual sense comes next, in which all the correlative functions of sight in the recognition of the dimensions of objects in height, length, size,

and the distinction of shades of colour, are taught. Then follows the estimation of the pupil's acuteness of hearing and perception of sounds, with his capacity to appreciate musical tones and notes. . . The senses of smell and taste require more special attention. The blind-folded child is taught to recognise a variety of flowers and other substances having characteristic odours. So he also quickly realises the difference in taste of various harmless solutions, whether bitter or acid, sweet or sour.

Many years have passed since the late James Hinton, the otologist, wrote on "seeing with the eyes shut," and now Dr. Montessori, in speaking of the power of very young children to discriminate between very small objects by touch alone, such as small coins, tiny balls, wheat, corn, or rice, tells us that they "are very proud of seeing without eyes." "Here are my eyes!" they exclaim, holding out their little hands.

In this course of instruction they are first taught to develop their sense of touch through the extreme sensitiveness of the peripheral nerves of their finger-tips, thus relieving the sight, which is its twin sense. This sensitive-



ness Dr. Montessori believes diminishes after the age of six. The blindfold child is taught to detect qualities of roughness or smoothness, degrees of warmth or coldness, the presence and nature of surface markings, as also the shape, form, dimensions, and weight of certain objects. And as the education progresses, so the method is extended to other senses, and finally applied to learning how to read and write.

The essential element in this didactic method is the auto-development and independent action of the child in his self-correction of error, and the stimulus to renew effort which arises from within, and is not forced from without. Grades of intelligence in children necessarily demand variation in the teacher's method, and involve in the beginning, both in regard to touch and sight, resort to stronger contrasts in the materials employed with some than with others. The mentally deficient child will require more interference to set him right, and greater patience on the part of his teacher. He is more indifferent, and usually has not the same interest in the success of any exercise or experiment as the normal child.

The didactic material employed in this

system is infinitely varied. The child's hands are drawn lightly over different surfaces, textures, and designs ; over smooth and rough paper (as sandpaper) with eyes closed ; cubes and bricks of different sizes, shapes, and colours have to be distinguished and arranged, or little towers constructed with them ; card tablets of coloured silk or wool ; tablets of different kinds of wood are used to distinguish fine differences in weight ; stairs of different breadth and length, as well as towers, are constructed with cubes to teach dimensions ; prisms, rods, and cubes are used to teach form and shape ; insets of pentagonal, triangular, elliptic, oval, circular, square and other geometrical forms, and of different sizes, have to be inserted in corresponding apertures made in suitable frames or trays. These form the well-known "insets." Children from three to four years old learn to button and lace, to fasten with hook and eye, to make bows, to use automatic fasteners, and so on until the child can dress herself. Light tablets of eight tints of eight colours, black, red, orange, green, blue, violet and brown, are employed to teach intensity and variety of colour, and these are duplicated.

When all are mixed, the child has to select the special tint of the particular colour asked for.

To educate the sense of sound, whispering, the movement of boxes filled with sand, Pizzoli's series of little whistles, bells of different tones suspended on wooden frames, and other acoustic means are employed. The difference in individuals in the limits of the hearing are only realised by those who are accustomed to test this sense. In experiments with Edelmann's whistle, on persons with apparently excellent hearing, it is quite common to find a difference of two or three thousand vibrations a second in the ability to hear overtones. With this whistle, by the aid of dust waves, I have been able to photograph up to 40,000 vibrations per second, so it will be easily understood how such differences may imperceptibly exist.

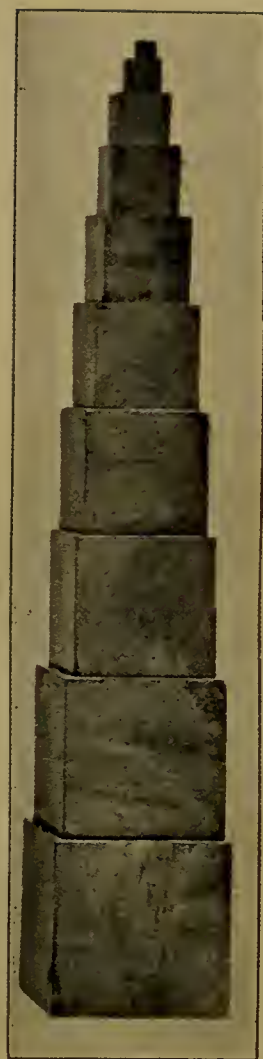
When all these steps in the primary education of the senses are completed, the teaching of reading and writing is commenced. Dr. Montessori is very emphatic on the advantage of instruction in writing preceding that of reading. "Security in reading," she says, "is arrived at much more slowly than the perfection of writing. In the majority of cases



Tablets wound with various coloured silks are used for educating the chromatic sense.



Cardboard letters are contained in various sized compartments; some of these have sandpaper surfaces. The child listens for the word spoken by the teacher—each syllable is spoken distinctly—the little listener then picks out the letters and arranges these in proper sequence.



Tower.

Blocks of various sizes are used to teach thickness, length and size. Stairs of different width and height of steps are made with these.

the child who writes beautifully still reads poorly.'” Alphabets of sandpaper, variously coloured, and fixed on strips of white paper are used in the teaching of writing; also outlines of various geometrical figures, placed on metal frames, are followed by the little pupil on white paper, and these metal insets are movable. The child can fill in the outline figures in various colours.

This is the child's instruction in the use of pencil and pen. Working with such alphabets, Dr. Montessori relates how two little ones of four years old “wrote each one in the name of his companions a letter of good wishes and thanks to Signor Edvardo Talamo.”

Exercises in pronunciation follow. As the letters are outlined, the child is taught the associated sound made in the articulation of each. The alphabet with the vowels mastered, the compositions of words follows, beginning with the simplest.

Dr. Montessori says: “Writing is very quickly learned, because we begin to teach it only to those children who show a desire for it by spontaneous attention to the lesson given to other children, or by watching the exercises in which others are occupied. All



children of four," she says, "are intensely interested in writing, and some have begun to write at the age of three-and-a-half. The average time that elapses between the first trial of the preparatory exercise and the first written word is, for children of four years, from a month to a month-and-a-half; for those of five, about a month. But one child wrote all the letters of the alphabet in twenty days. After three months time, the children, she tells us, are generally experts. The form of the letters also are rounded and flowing, much better than that of the scholars in elementary schools.

### Application to Ambidexterity.

It is to me surprising to find that only in one instance does Dr. Montessori in her work refer to ambidexterity in the child. This was in the case of one of her very youngest pupils, aged three years. The little blindfolded girl had repeated perfectly the lesson of placing in their proper positions, to the right hand and left, cubes of wood and small bricks. This involved recognition of the nature, form,

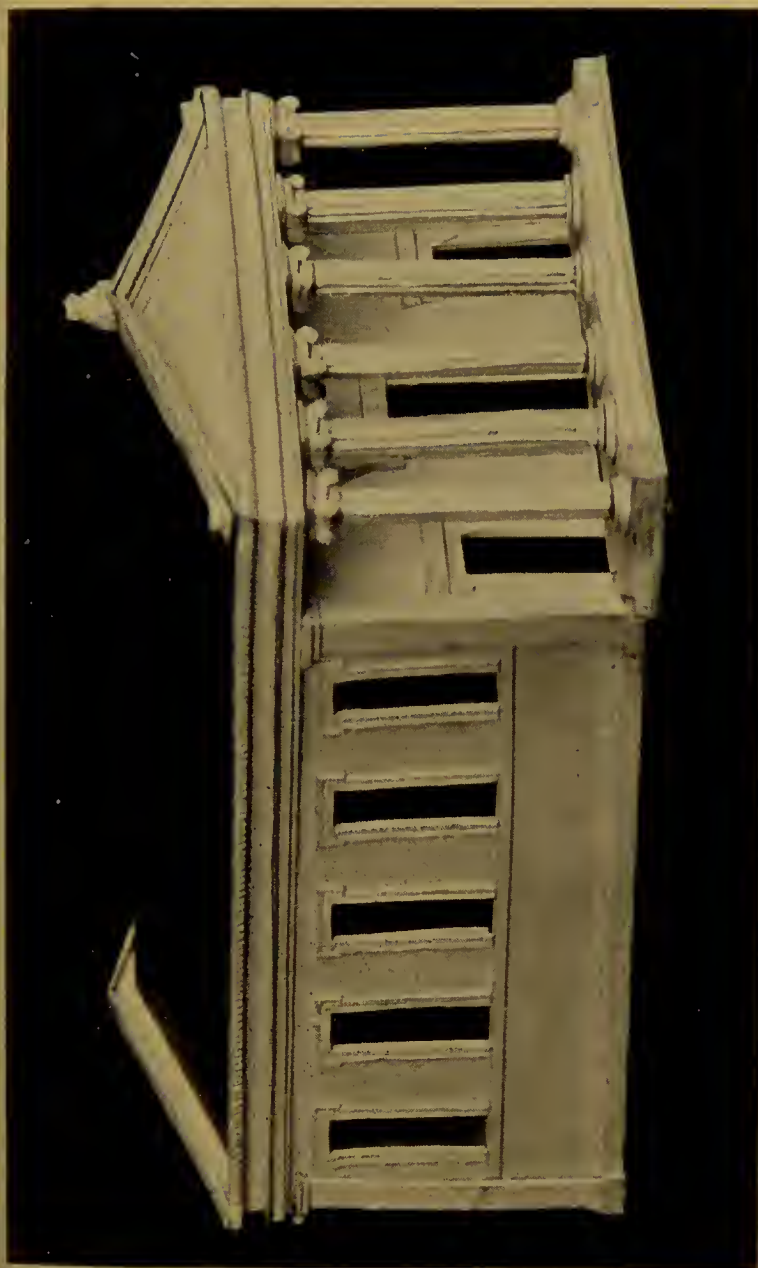
and proper disposition of the objects. Instantaneously, at the very first touch, she recognised the difference. "Continuing my study of the subject," she goes on to say, "*I found that this little girl was possessed of a remarkable functional ambidexterity. I should be very glad to make a wider study of this phenomenon, having in view the desirability of the simultaneous education of both hands.*"

For this very reason I have introduced a notice of Dr. Montessori's work, that I might emphasise the importance of adding to her didactic methods of teaching the cultivation of Ambidexterity. Every argument she urges from the psychological and physiological side is strengthened by its teaching, and at the early years at which she commences, from two-and-a-half years upwards, before the child has had the two-handed faculty interfered with by the enforced use of the right hand rather than the left, this education would be comparatively easy. All the exercises and games on which she relies to gain her psychophysical results can be carried out equally well with the left as the right hand. There would be the enormous gain of finding a pupil

of five years endowed with dual deftness of touch, dual centres of intellectual cognition, dual harmony in muscular action, with the added power of simultaneous movement of the arms and hands. The child of five years "who a month after entering the Children's House could compose any word," could "write on the black board in free design, drawing a horse and chair very cleverly," could "cover a little carpet with finely shaded colours," yet "whose memory for names (of colours) was defective," would with ambidextral training not only duplicate his discriminative and manipulative ability, but his powers of associating names of colours and objects would be increased. In short, there would be an enormous gain to the training for "practical life." All she advances in regard to "the defects of language due to education," and the different faults of pronunciation, are the result of improper education during the development of the speech centres.\* The various lingual and labial movements concerned with correct pronunciation require for their perfection a harmonious relation of the

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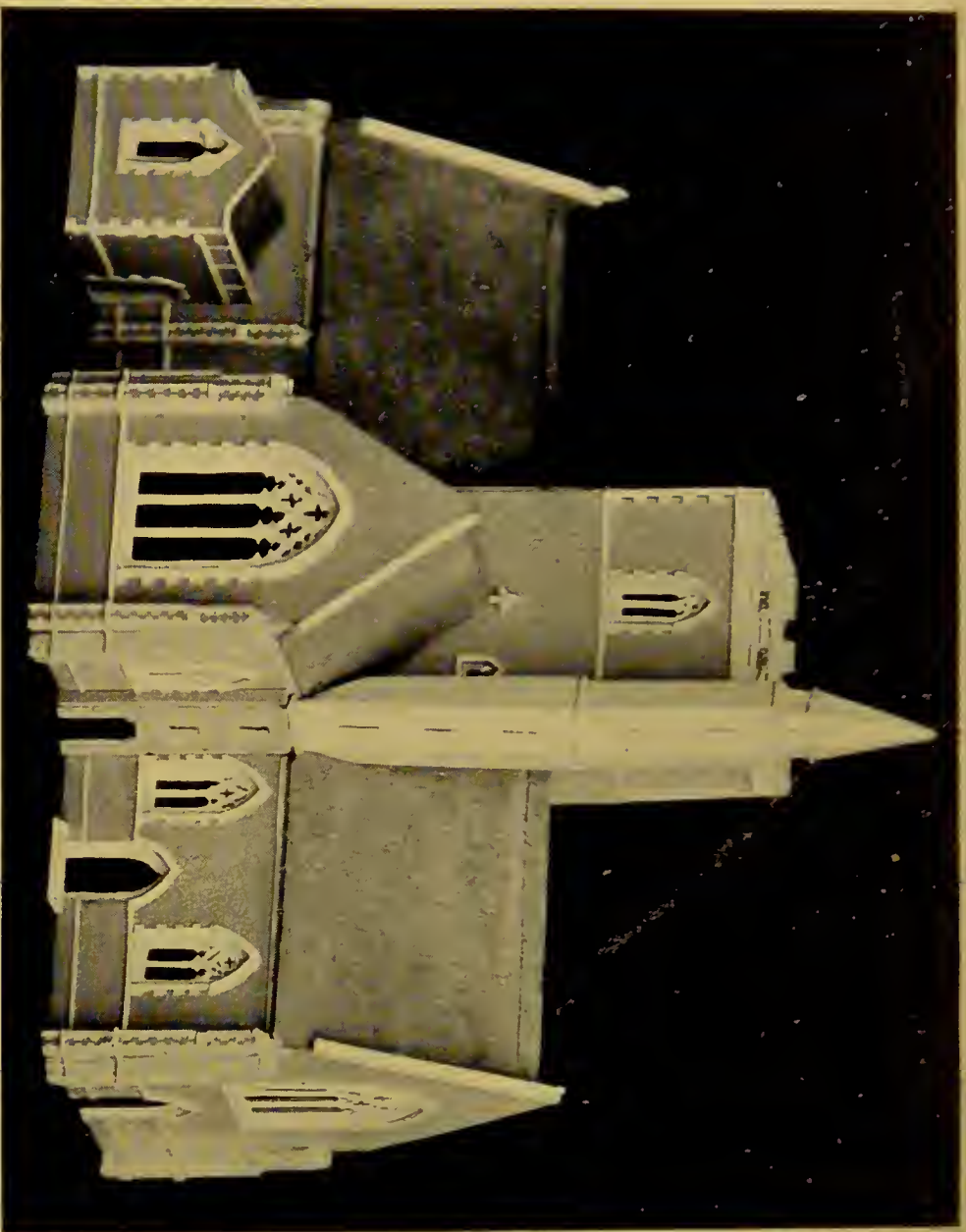
\* *Vide* scheme Frontispiece.



From photograph of a cardboard model of St. John's, Clapham, made with the left hand.

Length of original, 4 ins., width, 3 ins., height,  $2\frac{1}{2}$  ins.

These beautifully made models are the work of Mrs. William Warren, of High Barnet. They were made when she was a child. Her daughter, Miss Gertrude Warren, is a most skilful needlewoman with the left hand.



Kingswood Church  
near Banstead,

Surrey.

Nov. 1857.

Length of Model  
 $5\frac{1}{4}$  ins.

Height of Tower  
4 ins.

speech centres to the complicated nervous distribution and muscular mechanism involved in the act of speech. To exercise equally both centres, through written speech and spoken language, from the earliest years, must tend to prevent faults of pronunciation which are, unfortunately, only too prevalent in those to whom distinct speech is an essential in their professional calling.



## CHAPTER V

### Ambidextrous Work

I must deal very briefly with the advantages the ambidextrous worker possesses over the unidextrous. These conclusions may in the start be affirmed as true: (*a*) Facility in the use of the left hand does not affect the manipulative powers of the right. On the contrary, the experience, gained by co-operative and simultaneous use, endows the latter with new capabilities, and initiates it, through simultaneous action of the two brain centres, to activities which would never otherwise be generated. (*b*) Ambidexterity becomes invaluable to its possessor when, either through disease or injury, the left speech and motor centre is affected or rendered useless. (*c*) The training of the left hand to work alternately or simultaneously with the right has

an important effect in sharpening the mental faculties, especially those which are needed in the construction and execution of any work in which there is originality of design. Such mental influence is not without its effect on character. (*d*) In self-preservation and defence the advantage is obvious, not only in averting accident, but in giving additional safety to life and limb under various circumstances. Mr. Jackson enumerates some 500 occupations in which ambidexterity comes in as a distinct gain, or as an essential factor for success. But such an enumeration is not necessary in face of the fact, that in every calling in which the hand comes in as an accessory to the brain, this two-handedness must be not merely a gain, but frequently an indispensable aid to final accomplishment.

### Some Personal Experiences.

In the year 1868, I commenced operating on the eye, finally working up the hospital I then established (the Cork Eye, Ear and Throat) to the number of thirty beds. For the first time I realized the great disadvantage of

the inability to use my left hand equally with my right, the surgical position being behind the head of the patient. I had to stand in front in order to operate on the left eye, so that I might carry the knife from left to right with the right hand. I determined to overcome the difficulty, and by a strong exercise of will and a little practice I got control over the left hand. In time, I could operate equally well with either hand; yet when out of sorts, or unstable from overwork (work which in those days meant sixteen or eighteen hours out of the twenty four) I could not trust my left hand, and was compelled to use my right.

At an early age I had to practise obstetrics, and quickly learned the truth of the aphoristic teaching of the late Dr. Robert Barnes "that every obstetrician should learn to shave himself with his left hand." Ten years in an anatomical room as Demonstrator and Lecturer taught me that to be a neat and minute dissector, dealing with certain structural conditions, the left was an equally important hand to the right. And later on the same truth was impressed upon me in general surgery.

As a boy, and at college, I had the repu-

tation of being a good handball player. My superiority in great measure was due to equal dexterity with both hands. I learned from the hands of an expert fellow-student the use of the gloves, and I realized practically, through certain facial experiences, the secret of the success of the famous Tom Sayers in the ring, and in his memorable fight with the giant Heenan, when he gained that marvellous draw, in which round after round was fought with his left hand alone, the right arm having been rendered useless early in the fight.

### In Games.

As touching left-handedness in games, Major Trevor's remarks on left-hand cricket are interesting and worthy of the consideration of school teachers generally, especially in view of a recent remarkable success of the Royal British Orphan School, to which Eton's Head Master has drawn special attention. The players on the Eton side were picked cricketers from Mr Martin's house, of the average age of fifteen, and they challenged the

Orphans. In this match the left-handed swerve bowler sent back the Etonians' best bat, and then, in the next two deliveries, accomplished the hat trick.

"I make no apology," says Major Trevor, "for again drawing attention to the very practical success of left-hand cricket." \* And he shows that out of the first twelve present-day run getters, three (Messrs Mead, Wolley, and Gunn) are left-handed, though only one tenth of the leading batsmen are. Of the first sixteen bowlers, nine are left-handed. These statistics, he says, "are sufficient to prove the prominence in cricket of the man who relies much on his left hand." "The careful person who would take the trouble to study the evidence in this matter would probably come to the conclusion that the Australians valued a shade too much the value of left-hand batting, and that we ourselves erred in the same way as to the value of left-hand bowling." The cricketer, however, whether batsman or bowler, who could use both arms with equal dexterity and effect would be a puzzling adversary to meet, either in defence of the wicket, or in attack, and equally formidable as wicket-keep, or in the field.

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\* Daily Telegraph.



Simultaneous two-handed drawing by young girl.  
(From "Ambidexterity," by J. Jackson).

*Horatio Nelson*

1

*Nelson for route*

2

Lord Nelson's signature before (1) and after (2) the loss of his right arm. (From "Ambidexterity").

(17)





## In Typing.

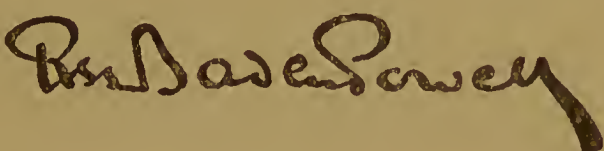
An interesting case came under my personal observation. An authoress of distinction used a double-key type-writer for copying her written MS. She could not, as she said, "compose upon it." A few years later, her sight being affected through refractive trouble, she adopted the "touch" system, and resorted to a single keyboard machine—Underwood's. In this system all the fingers of both hands and either thumb, have to be used equally. The typing can be done with the eyes closed, or in the dark. With facility in the working of the machine, she found that whereas in former days she was often at fault in thinking what was to come next, she now composed her journalistic work straight off on her machine, and made but few alterations afterwards. I have known this lady type to rapid dictation, without a mistake in letter or word, with her eyes closed.

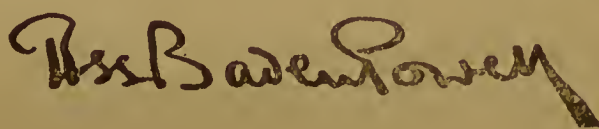
Possibly no more wonderful instance of perfect unison in the working of brain and hand can be found than in that of Sir Edwin Landseer. No one has ever excelled him in the rapidity of his draftsmanship; and

this not only when he worked with the left hand alone, but in his achievements in design and execution when drawing with both hands, and, at the same time, totally different subjects. This was shown on the occasion when, at a social gathering where the subject was under discussion, he drew, perfectly and simultaneously, the complete profile of a stag's head and antlers with one hand, and a horse's head with the other.

All Boy Scouts should follow the example of the popular and patriotic originator of this splendid national movement, General Sir Baden Powell, who from his youth has been ambidextrous. He does not consider a man to be a thoroughly trained soldier unless he can mount equally well on either side of his horse, use sword, pistol, and lance equally well with both hands, and shoot off the left shoulder as rapidly and accurately as from the right. This advantage he proved in his own person when in some manœuvres he was prevented by a dog bite from using his right hand. He continued on duty for the whole time, sending in his reports, illustrated with maps and sketches, as well executed as if done with the right hand. The

Germans, who are second to no nation in the world in their powers of organization, and insistence upon system, are not insensible to the advantages of ambidexterity in war, and are, I believe, making enquiries in regard to it in their military schools.

Right: 

Left: 

That most brilliant of exponents of black-and-white art, Mr. Joseph Pennell, draws with equal facility with the left as the right hand. I have seen examples of his writing in mirror, as also of the *boustrophedon*, to which I have already referred.

As an instance from the domain of science, there was no warmer advocate for the teaching of ambidexterity than the late Sir Daniel Wilson (Scotsman by birth), President of Toronto University, the eminent archæologist

and anthropologist. He used either hand indifferently: "in resorting to the left he was not conscious of the change."

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If by the perusal of these pages I shall have aroused the interests of my readers, and brought new recruits to the cause of the teaching of ambidexterity in our schools, the object I had in view in writing them will be gained. I anticipate a time when it will no longer be rare to find the two-handed man or woman workers equally proficient in execution with both hands. When this advance has been made, there will be a corresponding gain to the mental side of life. The alternating or synchronous action of the dual sided brain, left and right sides equally co-operating with the associated arm and hand, and equally educated in their functional powers and uses, must have its psycho-physical influence on the individual. The judicious training and education necessary to bring about this harmonious co-operation of the master force of mind with its dependant motor servant executing its orders, must have, if universally adopted in the nation's school, an important influence on the national character. In these

days when the struggle for existence at home, and the international rivalry and competition abroad, are increasing in every direction, the nation cannot afford to ignore any step that can be taken to improve the general and technical systems of education. The one word that has to be graven deep on the milestones of a nation's progress is EFFORT!

Any one who has listened to a recital of Pachmann, Paderewsky, or Backhaus on the piano, Kubelik on the violin, must have realised the marvellous ambidextrous manipulation, automatically associated with the mental impulses and ideas expressed in the execution. In listening recently to M. de Pachmann one was spell-bound at his rendering of the "Gondoliers" of Liszt, Mozart's Fantasia in C Minor, Schumann's Grand Humoresque (Op. 20 in B Flat), and the Etude in C Major of Chopin.

Impressions of scenery, dramatic representations, whether stern, joyous, or sad; emotional outbursts, gay or sorrowful, all were conveyed to the hearer with a lightning rapidity of touch and fingering, to which apparently the whole being of the performer vibrated. Yet, throughout all, melody and



harmony were never absent. One felt that the performer was in touch with the very soul of the composer, and that the instrument was the medium of expression of the impulses that stirred his conceptions.

Dr. Markham, in his delightful analysis of the pieces played on this occasion, says of the last: "The left hand has a most interesting part to play, especially in a delicate arpeggio figure." All through there is demanded of both hands great "dexterity and neatness in changing the fingers." Of another prelude of Chopin's, he says:—"There is a subdued, murmuring accompaniment for the left hand running through it, the right hand having a melody of sustained notes."

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A few additional opinions to those already quoted in the text.

"What would be the effect on the functions of the brain of the systematic cultivation of ambidexterity? By this I mean the systematic compulsory use of the right and left hands equally for all manual occupations, including writing. The result would certainly be, as far as can be judged from present facts, to secure an immunity from the grave effects on speech of diseases of either side of the brain, should such disease occur."

"The advantages of a perfect ambidexterity are utterly inconceivable by those who have never possessed them."

Sir WILLIAM GOWERS, M.D., F.R.G.S., F.R.S.

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"In all the ordinary and simple operations of life it is a great advantage to be able to use the left hand as well as the right. I should say, educate the left hand as far as possible."

Sir S. WILKS, M.D., F.R.S.

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"Ambidexterity has been a great help to me in life, and I gladly encourage it."

T. OUTTERSON WOOD, M.D., F.R.C.P.

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"Ambidexterity would prevent many occupation pases, and give us a better chance of living a longer and healthier life."

Sir J. SAWYER, M.D., F.R.C.P., F.R.S.

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"In all cases of aphasia brought to me for treatment, I have instituted the systematic exercises of the left hand for writing; and I was invariably able to show a distinct parallelism between the improvement in the power of articulation and improvement in writing with the left hand."

A. CHURCH, M.D. (U.S.A.).

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"I consider that the teaching of ambidexterity in elementary and secondary schools to be one of the most valuable innovations in tuition of the age."

E. NOBLE SMITH, F.R.C.S.

"It is a very great mistake we commit in not teaching our children to make use of the two sides of the body indifferently."

C. E. BROWN-SEQUARD, M.D., F.R.C.P.,  
F.R.S.

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"The use of both hands in children should be encouraged, for experience has shown that there is no enfeeblement, but a strengthening of the mental powers in consequence."

Sir T. OLIVER, D.Sc., M.D., F.R.C.P.

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"When ambidexterity becomes the common property of all civilized states, new paths leading to a new really important era will be opened up to us all, with a peaceful battle of intellects in perhaps undreamt of varieties, and higher planes of thought."

M. FRAENKEL, M.D. (Berlin).

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"That many worthy lives have fallen a sacrifice to this Moloch of education—one-handedness—is undoubtedly true."

W. A. HOLLIS, M.D., F.R.C.P.

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"The training of each hand for writing or other mechanical work is good, and likely to prove in a high degree useful."

H. C. BASTIAN, M.D., F.R.C.P., F.R.S.











